

1 **CLAIMS**

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3 **1.** One or more computer-readable media comprising computer-executable
4 instructions that perform the following when executed by a computer:

5 receiving incoming packets of data and metadata;
6 synchronizing the incoming packets; and
7 linearly combining the data of each of synchronized incoming packets into
8 an outgoing packet.

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10 **2.** The computer-readable media of claim 1, further comprising:
11 sending the outgoing packet.

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13 **3.** The computer-readable media of claim 1, further comprising including
14 synchronization information in the metadata of the outgoing packet.

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16 **4.** The computer-readable media of claim 1, wherein the synchronizing
17 includes reading synchronization information from the metadata, the
18 synchronization information including a sequence number.

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20 **5.** The computer-readable media of claim 1, wherein the synchronizing
21 includes reading synchronization information from the metadata, the
22 synchronization information including time slots, wherein the incoming packets
23 having matching time slots are deemed synchronized.

1 6. The computer-readable media of claim 1, wherein the synchronizing
2 includes reading synchronization information from the metadata.

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4 7. The computer-readable media of claim 1, further comprising:
5 receiving the outgoing packet and other outgoing packets;
6 synchronizing the outgoing packet and the other outgoing packets;
7 linearly combining the synchronized outgoing packets into a second
8 generation outgoing packet; and
9 sending the second generation outgoing packet of data.

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11 8. The computer-readable media of claim 1, wherein the data of each of the
12 incoming packets includes one or more parts, or a linear combination of one or
13 more parts, of a set of data and further comprising recording, within the outgoing
14 packet, a complete linear combination of the set of data that is present within the
15 outgoing packet.

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17 9. The computer-readable media of claim 1, wherein the data of each of the
18 incoming packets includes one or more vectors, or a linear combination of one or
19 more vectors, of a set of data vectors and further comprising recording, within the
20 outgoing packet, coefficients representing all linear combinations of the set of data
21 vectors present within the data of the outgoing packet.

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23 10. The computer-readable media of claim 1, wherein the data of each of the
24 incoming packets includes one or more vectors, or a linear combination of one or
25 more vectors, of a set of data vectors and further comprising recording, within the

1 outgoing packet, information sufficient to disassemble the data in the outgoing
2 packet into the set of data vectors if all but one of each of the vectors in the set of
3 data vectors is known.

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5 **11.** The computer-readable media of claim 10, wherein the recording is made
6 into a header of the outgoing packet.

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8 **12.** A system comprising:

9 a node of a communication network, wherein the node is capable of:

10 linearly combining data from multiple incoming packets of data into an
11 outgoing packet of data, the data from each of the multiple incoming packets being
12 a linear combination of an original set of data vectors and each of the multiple
13 incoming packets including incoming metadata indicating the linear combination
14 of the original set of data vectors present in each of the multiple incoming packets;
15 and

16 recording into the outgoing packet, based on the linear combination
17 performed on the data from the multiple incoming packets and the incoming
18 metadata, outgoing metadata indicating the linear combination of the original set
19 of data vectors present in the outgoing packet.

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21 **13.** The system of claim 12, wherein the node is further capable of:

22 receiving the incoming packets of data; and

23 sending the outgoing packet of data.
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1 14. The system of claim 12, wherein the node includes a computer server.

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3 15. The system of claim 12, wherein the node includes a computer.

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5 16. The system of claim 12, wherein the node includes a router.

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7 17. One or more computer-readable media comprising computer-executable
8 instructions that perform the following when executed by a computer:

9 receiving incoming packets of data and metadata, the data of each incoming
10 packet being a linear combination of an original set of data vectors, the data
11 vectors in the original set of data vectors being identically partitioned into a first
12 number of layers of data, wherein at least one of the data vectors contains a layer
13 of data that is set to elements computable from the other data vectors;

14 determining, based on the metadata in each of the incoming packets, the
15 linear combination of the original set of data vectors that is present within each of
16 the incoming packets; and

17 inverting the data in each of the incoming packets to obtain a second
18 number of layers of data of the original set of data vectors, wherein the second
19 number is less than the first number.

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21 18. The computer-readable media of claim 17, wherein the elements
22 computable from the other data vectors are zero.

1 **19.** The computer-readable media of claim 17, wherein the metadata of each
2 incoming packet indicates the linear combination of the original set of data vectors
3 that is present within the incoming packet.
4

5 **20.** An apparatus comprising:

6 means for receiving incoming packets of information, each of the incoming
7 packets having incoming data and incoming metadata, each of the incoming data
8 being a linear combination of an original set of data vectors and each of the
9 incoming metadata indicating the linear combination present in each of the
10 incoming data;

11 means for linearly combining the incoming data of the incoming packets of
12 information into an outgoing packet of information; and

13 means for recording outgoing metadata within the outgoing packet, the
14 outgoing metadata indicating a linear combination of the original set of data
15 vectors present in the outgoing data.
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17 **21.** The apparatus of claim 20, further comprising:

18 means for disassembling, with aid from the outgoing metadata, the linear
19 combination within the outgoing packet into the original set of data vectors.
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